# Operating Experience Weekly Summary 97-50

*December 5 through December 11, 1997*

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# *EVENTS*

## 1. LOCKOUT/TAGOUT VIOLATIONS AT THE SAVANNAH RIVER SITE

This week OEAF engineers reviewed two events involving lockout/tagout violations that occurred at the Savannah River Site on December 8, 1997. At the L-Reactor facility, an operator installed a lockout on the wrong lockout point for maintenance on a compressed air system. Independent verification of the lockout failed to catch the error. At the Laboratory Technical Area facility, technicians worked on an extrusion press without anyone signing as a holder of the lockout/tagout. Without a holder for the lockout/tagout, the issuing authority could have cleared the lockout while work was still in progress. There were no injuries or equipment damage in either of these events. It is important that personnel adhere to established lockout/tagout programs and procedures. The functions of lockout/tagout programs in DOE are to: (1) protect personnel from injury and equipment from damage and (2) provide overall control of equipment and system status. (ORPS Reports SR--WSRC-REACL-1997-0013 and SR--WSRC-LTA-1997-0035)

At the L-Reactor facility, an operator removing a lockout/tagout discovered that a valve did not have a lock and tag as required by the lockout/tagout order. The operator who performed the lockout/tagout had placed the lock and tag on the wrong valve. The independent verifier checked the lockout but did not find the error.

The facility manager conducted a critique of this event. Critique members determined that the system drawings and lockout/tagout order were correct and the valves were correctly labeled. This indicated inattention to detail on the part of both the lockout installer and the verifier. They also determined that maintenance personnel did not verify every isolation point before commencing the work. Maintenance personnel only verified boundaries they felt were within the scope of their work. Critique members also learned that the lockout/tagout holders were signed onto the lockout by the lockout preparer over the telephone. A corrective action will require lockout/tagout holders to review all lockout points before signing the lockout/tagout. The facility manager will issue a lessons learned document to facility personnel on this occurrence emphasizing the importance of attention to detail and directing them to ensure the information on the tag exactly matches the lockout/tagout plan and the component label information and to minimize the use of telephone signatures.

At the Laboratory Technical Area facility, a facility manager representative reviewing a lockout/tagout discovered two technicians performed work under the lockout/tagout without a lockout/tagout holder signed onto the lockout. The two technicians were installing a new control circuit on an extrusion press. The facility manager representative contacted the facility operations manager, and he issued a stop work order for the work activity.

Investigators determined that the technicians had correctly isolated the equipment, walked down the isolation points, and performed a zero energy check. The technicians were trained in the lockout/tagout process and knew that either they or their supervisor had to sign as the holder. Investigators determined that a breakdown in communication had occurred because each believed the other had signed as the holder.

These events underscore the need for personnel to ensure that the documentation used in the lockout/tagout process is properly administered. Lockout/tagout holders should verify that the locks and tags have been correctly installed on the isolation boundaries and the paperwork is signed indicating acceptance and responsibility for the lockout. Also, personnel installing and verifying locks and tags need to ensure that the correct isolation points are locked and tagged in the correct positions as directed by the lockout/tagout order. The following references address lockout/tagout requirements and provide guidance for independent verification.

- DOE-STD-1030-96, *Guide to Good Practices for Lockouts and Tagouts*, provides guidance on lockout/tagout program implementation and management at DOE facilities. The standard defines a lockout/tagout holder as a qualified individual who is authorized to work, or to supervise work, under a centrally controlled lockout/tagout. A lockout/tagout holder is the same as the authorized person who is responsible for (that is, being protected by) the lockout or tagout device or the employee in charge of the clearance as designated by OSHA. Section 4.4.2, "Documentation of Lockout/Tagout," states that a lockout/tagout that involves multiple isolation points or uses several individuals or work groups should document: (1) authorization, (2) placement of locks and tags, (3) verification of effectiveness, (4) acceptance by individual workers or work group representatives, (5) release by workers at the completion of the job, (6) authorization for removal of locks and tags, and (7) restoration to operable condition.

- DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, chapters IX, "Lockouts and Tagouts," and X, "Independent Verification," also contain direction on these subjects.

- DOE-STD-1036-93, *Guide to Good Practices for Independent Verification*. The standard states that independent verification should always be performed after installation of a lockout/tagout to ensure adequate protection for workers. Section 4.3.7, "Verifying Locked/Tagged Components," states that the verifier should verify that the correct component has been identified and the position of the component is as stated on the danger tag.

- OSHA regulations contain several references to lockout/tagout. These include: 29 CFR 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*; 29 CFR 1910.333, *Safety-Related Work Practices*; 29 CFR 1910.269, *Electric Power Generation, Transmission, and Distribution*; and 29 CFR 1926.417, *Lockout and Tagging of Circuits*.

- Two Safety Notices and one Safety Note on this subject have been issued: DOE/EH-0540, Safety Notice 96-05, *Lockout/Tagout Programs*; DOE/EH-0502, Safety Notice 95-02, *Independent Verification and Self-Checking*; and DOE/EH-0180, Safety Note, 91-04, *Control of Hazardous Energy*.

- DOE-EH-33, *Hazard and Barrier Analysis Guide* provides techniques and tools for determining the effectiveness of barriers, such as the lockout/tagout, for the safe execution of work.

Safety Notices 96-05 and 95-02 can be obtained by contacting the ES&H Information Center, (800) 473-4375, or by writing to U.S. Department of Energy,ES&H Information Center, EH-72, 19901 Germantown Road, Germantown, MD 20874.

Safety Notices are also available on the OEAF Home Page at http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ons/ons.html. A copy the *Hazard and Barrier Analysis Guide* is available from Jim Snell, (301) 903-4094, and may also be obtained by contacting the ES&H Information Center, (800) 473-4375, or by writing to U.S. Department of Energy, ES&H Information Center, EH-72, 19901 Germantown Road, Germantown, MD 20874.

**KEYWORDS:** lockout and tagout, inattention to detail, independent verification, communication

**FUNCTIONAL AREAS:** Operations, Electrical Maintenance, Mechanical Maintenance

## 2. LOSS OF EXHAUST VENTILATION RESULTS IN PRESSURE INVERSION

On December 2, 1997, at the Los Alamos National Laboratory, loss of exhaust ventilation with a supply fan running resulted in a positive ventilation condition (pressure inversion) in the radiological laboratories at the Chemistry and Metallurgy Research Facility. A power fluctuation on the main electrical feeder for the operating exhaust fan caused the fan to stop. The supply fan continued to operate because of an incorrect switch line-up on its motor controller. The pressure inversion occurred during non-working hours and did not result in the spread of contamination. Maintaining a negative differential pressure between areas of the facility is an important engineered control to prevent the spread of contamination. (ORPS Report ALO-LA-LANL-CMR-1997-0023)

On October 28, 1997, operators secured one of the two exhaust fans for a wing in the facility because of a problem with a turning vane inside the fan exhaust plenum. The other exhaust fan remained in high speed to provide exhaust ventilation and maintain negative pressure in the radiological laboratories. The two supply fans were operating in slow speed to provide the supply ventilation. On November 28, one of the supply fans tripped on a ground fault. The control switch for the remaining supply fan was in the "automatic" position. This meant that if exhaust ventilation were lost in the wing, the fan would automatically shut down to prevent a pressure inversion. Operators were concerned that automatic controls might inadvertently switch the supply fan from slow speed to high speed, so they placed its control switch in the "manual" position to inhibit all automatic controls for the fan.

On December 2, a snowstorm forced the closure of the Laboratory, and all personnel went home. The adverse weather conditions subsequently produced a power fluctuation that caused the protection circuitry for the exhaust fans to shut down the operating exhaust fan. The pressure inversion occurred in the radiological laboratories located in the affected wing. On-call operators returned to the facility to investigate and found the operating supply fan with its control switch in the manual position. They also found a photohelic gage stuck at the pressure reading when the exhaust fan was operating. This would have prevented the automatic shutdown of the supply fan. The operators tapped the gage and the reading went to zero. The operators then placed the supply fan control switch in automatic, and the fan shut down. When operators re-started the operable exhaust fan in high speed, the supply fan restarted in slow speed, and the ventilation line-up returned to its original configuration.

The facility manager convened a critique on the ventilation system problems. Critique members determined that the operators who placed the control switch for the supply fan in manual did not understand the logic associated with the automatic controls. The operators had good intentions, but they did not consider power fluctuations that could affect the protection logic. The supply fan would not have shifted to high speed in automatic; therefore, it would not have caused a pressure inversion, as the operators believed. In fact, the manual position prevented the fan from shutting down during the power fluctuation. Operators are verifying the correct switch positions for all supply and exhaust ventilation controls and technicians are checking the operation of all photohelic gages in the facility. This was the second pressure inversion experienced at this facility in the past 5 months.

NFS has reported numerous events in the Weekly Summary where ventilation air flow reversed. Following are some examples.

- Weekly Summary 97-32 reported that mechanics caused a positive ventilation (inversion) condition in a wing of the Chemistry and Metallurgy Research Facility at the Los Alamos National Laboratory. The mechanics incorrectly positioned valves associated with an air dryer, allowing air to bleed from opening mechanisms on ventilation dampers, causing the dampers to close. Investigators determined that work control weaknesses allowed the mechanics to work on the system without adequate knowledge and without facility management approval. (ORPS Report ALO-LA-LANL-CMR-1997-0009)

- Weekly Summary 97-10 reported that environmental restoration surveillance and maintenance workers observed indications of pressurization of an inactive facility and a potential release of airborne radiological material at Hanford. The building is connected to the another plant's ventilation system and is normally maintained slightly below atmospheric pressure. Investigators believe high winds caused a change in building pressure because of the deteriorated state of the facility. The increase in pressure could have caused a radiological release from contaminated cells in the building. (ORPS Report RL--BHI-DND-1997-0004)

- Weekly Summary 94-11 reported that the removal of a barrier wall at the Savannah River Site caused an air reversal in a building that allowed air flow from a radiological control area to a control room and offices. The air reversal could have resulted in radiological contamination of occupied workspaces. Investigators determined that engineers did not identify the impact removing the wall had on ventilation system operation during their design review process. (ORPS Report SR--WSRC-HCAN-1994-0033)

This event illustrates the importance of operators understanding the control schemes and system logic that affect the operation of facility equipment. Training programs should address operating features and controls in systems training courses. Operating mode changes should also be addressed in procedures, with notes or precautions that alert operators to the fact that protective features may be defeated if systems are in manual modes. Supervisors and managers should ensure that the operating configuration of equipment that provides engineered controls to prevent the spread of contamination is correct.

DOE O 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities,* states that the purpose of the Order is to assure that all persons are qualified to carry out their assigned responsibilities. Chapter I, sections 7.a.(1) and 7.a.(2), provide requirements for developing and maintaining training to meet the position requirements. Section 7.d.(4)(d) requires training in general and specific facility operating characteristics, facility instrumentation and control, and facility protection systems. Training department personnel also need to rigorously apply the principles and requirements of a systematic approach to training, such as performance-based training, as defined in chapter I.7.b of the Order.

**KEYWORDS:** operations, ventilation, exhaust fan, supply fan, training and qualifications

**FUNCTIONAL AREAS:** Operations, Training and Qualification

## 3. GLOVEBOX SHIELDING REMOVED WITHOUT APPROVAL

On December 3, 1997, at the Rocky Flats Environmental Technology Site, a radiological engineer discovered that maintenance carpenters removed Benelex shielding from a glovebox without approval. While reviewing radiological survey data forms, the engineer noticed that one of the forms documented radiological surveys for a glovebox that did not have either an approved as-low-as-reasonably-achievable review or an approved work package for shielding removal. The building operations manager terminated all building glovebox shielding-removal activities. Failure to follow procedural requirements for work packages can result in hazards to individuals performing the work and in unauthorized configuration changes that can lower safety margins. (ORPS Report RFO--KHLL-771OPS-1997-0055)

Investigators determined that maintenance carpenters were removing shielding from unused gloveboxes because the Benelex shielding is a fire hazard. The shielding-removal operation required packages and radiological work permits that specifically identified the applicable gloveboxes. Investigators determined that the carpenters did not notice they removed shielding from a glovebox that was not listed in either of these documents.

The building manager held a fact-finding meeting and determined that the carpenters used a work package and a radiological work permit for the shielding removal operation. The carpenters could not complete the operation for one glovebox listed in the approved documents because of scaffolding in the area. Therefore, they decided to continue the work on another glovebox. However, the second glovebox was not listed in either the work package or the radiological work permit. Meeting attendees learned that Benelex is used for neutron shielding and is attached to the gloveboxes. They also learned that gloveboxes that are not evaluated for hazards could contain contamination or be highly radioactive. Meeting attendees determined that that the unapproved shielding removal could have created a radiation area or a high radiation area or could have spread contamination outside of the radiological work permit limits. The building manager determined that this event was caused by the carpenters' inattention to detail and is developing corrective actions.

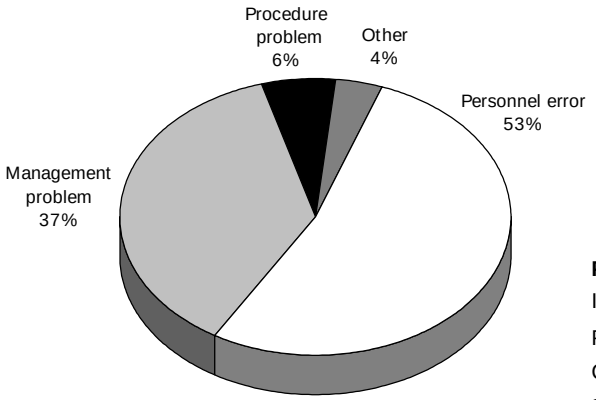
NFS has reported on work performed outside of work package scopes in several Weekly Summaries. Following are some examples.

- Weekly Summary 97-39 reported that electricians at the Savannah River Site caused a power loss to an instrument panel when they opened an electrical disconnect without authorization. The electricians had completed the installation of some heat tracing tape in accordance with a work permit and closed the breaker to

energize it. No power was supplied, so they decided to troubleshoot the problem. Investigators determined that the electricians' work permit did not allow for troubleshooting activities. (ORPS Report SR--WSRC-HTANK-1997-0028)

- Weekly Summary 97-15 reported that electricians at the Rocky Flats Environmental Technology Center disconnected a conduit containing a wire common to three transducers, causing a shut down of the building exhaust fans. The electricians were using an approved work package for replacement of a flow transmitter. However, disconnecting the conduit was not included in the work package. (ORPS Report RFO--KHLL-771OPS-1997-0018)

OEAF engineers searched the ORPS database for glovebox events involving procedures not used or used incorrectly and found 216 occurrences. Figure 3-1 shows the root causes for these events. A review of these occurrences shows that that facility managers reported 53 percent of the events as personnel errors, with 43 percent attributed to inattention to detail. In addition, managers reported 37 percent as a management problem, with 48 percent attributed to inadequate administrative control.




| Personnel Error | Percent |
|---|---|
| Inattention to detail | 43 |
| Procedure not used or used incorrectly | 40 |
| Communication problem | 11 |
| Other human error | 6 |

**Figure 3-1. Root Causes for Failure to Follow Procedures (Glovebox Events)[1]**

These events illustrate the need for workers to be accountable and consider the consequences of performing unauthorized work. Performing work outside the scope of procedures, radiological work permits, work packages, and authorization places personnel, equipment, and the environment at risk. In this event, the maintenance carpenters could easily have been contaminated, spread contamination, or created a radiation area by removing material from a glovebox that had not been evaluated for hazards.

[1] OEAF engineers searched the ORPS database using the graphical user interface for reports with a direct cause of "3B, procedure not used or used incorrectly" AND narrative containing "glovebox@" and found 216 occurrences. Based on a random sampling of 20 events, OEAF engineers determined that each slice is accurate within ± 2.8 percent.

Work control managers at DOE facilities should review their programs to ensure that the appropriate elements are incorporated. Facility personnel in charge of training should review the following applicable documents to ensure that training emphasizes the need for cautious attitudes and outlines the type of mistakes that can lead to contamination events, vital system degradation, or nuclear criticality safety issues.

- DOE O 4330.4B, *Maintenance Management Program*, provides guidance applicable to work control systems and procedures. Chapter 6, "Maintenance Procedures," identifies maintenance procedures and other work-related documents needed to provide appropriate work direction and ensure that maintenance is performed safely and efficiently. Chapter 8, "Control of Maintenance Activities," states that a work control program establishes the requirements for identifying, planning, approving, and conducting maintenance activities.

- DOE/EH-0256T, *Radiological Control Manual*, states: "Each person involved in radiological work is expected to demonstrate responsibility and accountability through an informed, disciplined, and cautious attitude toward radiation and radioactivity." The manual sets forth DOE guidance on the proper course of action in the area of radiological control.

- DOE/EH-0502, Safety Notice 95-02, "Independent Verification and Self-Checking," describes a technique that requires workers to (1) stop before performing the task to eliminate distractions and identify the correct component; (2) think about the task, expected response, and actions required if that response does not occur; (3) re-confirm the correct component and perform the function; and (4) review by comparing the actual versus the expected response. Human actions can be considered a barrier to provide controls over hazards associated with a job.

Safety Notice 95-02 can be obtained by contacting the ES&H Information Center, (800) 473-4375, or by writing to U.S. Department of Energy, ES&H Information Center, EH-72, 19901 Germantown Road, Germantown, MD 20874. Safety Notices are also available on the OEAF Home Page at http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ons/ons.html.

**KEYWORDS:** work planning, work procedure, procedure

**FUNCTIONAL AREAS:** Work Planning, Procedure

## 4. FIRE FIGHTER'S ACTIONS RESULT IN A NEAR MISS

On December 2, 1997, at the Rocky Flats Environmental Technology Site, investigators reported that a fire fighter cut a 13.8-kilovolt transformer compartment door lock and was potentially exposed to a hazardous electrical condition during an event that occurred in October. On October 8, 1997, fire department personnel responded to an alarm and discovered that the transformer was on fire. An electrician also responded to the alarm and used a disconnect switch to de-energize the transformer. While he was de-energizing the transformer, he noticed the fire fighter cutting the transformer compartment door lock with bolt cutters and directed him to stop. Investigators determined that because the electrical condition of the transformer was unknown the potential existed for the compartment and the lock to be energized. Failure to understand the potential danger exposed the fire fighter to an electrical hazard that could have resulted in an injury or fatality. (ORPS Report RFO--KHLL-UTILITIES-1997-0009)

Investigators believe that the fire fighter cut the lock with intent of accessing and removing the transformer fuses. However, they determined that removing the fuses inside the compartment would not have de-energized the transformer. Investigators also believe that the fire fighter did not have adequate electrical training or sufficient knowledge of the transformer design to attempt to de-energize the transformer.

The facility manager held a critique. Critique members determined that cutting the compartment lock potentially exposed the fire fighter to 13.8 kilovolts because he accessed equipment that could have been energized. They also determined that the line side of the compartment fuses were energized to 13.8 kilovolts. The facility manager is developing corrective actions to address actions required by fire fighters during emergency responses.

NFS reported a similar event about emergency response personnel electrically isolating equipment in Weekly Summary 94-40. In that event, operators and fire fighters at Brookhaven National Laboratory did not know how to secure electrical power to an experiment that was on fire. No procedures existed for electrically isolating the experiment in an emergency. (ORPS Report CH-BH-BNL-HFBR-1994-0005; Type B Investigation Report; and Weekly Summary 94-40)

These events illustrate the importance of ensuring emergency response personnel are adequately trained on hazards that they may encounter. Although training cannot anticipate every possible emergency scenario, it should establish what actions are expected and what actions should be avoided. In addition, all members of an emergency response team should understand their responsibilities in an emergency and perform only those functions.

Emergency response personnel and training department personnel should review the following documents to ensure that they understand their responsibilities and the hazards involved during emergency responses.

- DOE O 151.1, *Comprehensive Emergency Management System*, provides guidance to integrate emergency planning and preparedness activities for a comprehensive emergency management concept and to promote more efficient use of resources. It requires training and drills for specific emergency response capabilities for all personnel expected to respond to on-site emergencies.

- DOE O 420.1, *Facility Safety*, section 4.2 establishes facility safety requirements for fire protection programs and related hazards. This Order requires written, comprehensive fire protection criteria, including the organization, training, and responsibilities of the fire protection staff and administrative aspects of the fire protection program. It also requires completing a “needs assessment that establishes the minimum required capabilities of site fire fighting forces” and including it in the site emergency plan.

- OSHA regulations in 29 CFR 1910.156, sub-part L, “Fire Brigades,” state that each member of the fire brigade must be able to perform their assigned duties and function safely so as not to endanger fire brigade members or other employees. Appendix A, “Fire Protection,” states that fire brigade training and education must be commensurate with those functions that the brigade is expected to perform. It also states that fire brigades must have competent leadership and brigade supervisors during emergency situations who demonstrate skills in fire suppression and prevention, leadership, pre-fire planning, and safety practices.

- DOE issued, *Health and Safety Plan Guidelines*, for the preparation of site-specific health and safety plans. This guideline is based on the minimum requirements of 29 CFR 1910. Section 11.3 states that site emergency response plans should identify and define the roles of all personnel, organizations, and teams who will participate in emergency response. It also states that organizational structures should (1) show a clear chain-of-command, (2) ensure every person knows their position and authority, (3) be flexible enough to handle multiple emergencies, and (4) clearly identify specific roles and responsibilities.

The OSHA standard is available on the Internet at URL http://www.osha-slc.gov/. DOE's *Health and Safety Plan Guidelines* publication is available at URL http://tis.eh.doe.gov/docs/hasp/100130.txt.

**KEYWORDS:** fire, transformer, electrical safety

**FUNCTIONAL AREAS:** Industrial Safety, Fire Protection, Training and Qualification

## 5. FAILURE TO PROPERLY INVENTORY RADIOACTIVE MATERIALS WHEN RECEIVED

This week, OEAF engineers reviewed two events involving failure to properly inventory radioactive materials or equipment containing radioactive sources when received. On December 3, 1997, at the West Valley Demonstration Project, facility managers discovered that a gas chromatograph, no longer needed to support site missions, contained a radioactive source that was not included in the site radiological source inventory. On December 4, 1997, at the Sandia National Laboratory, radioactive materials received from off-site were not handled properly because the receiving clerk did not see the packing list and processed the material according to non-radiological procedures. Failure to properly inventory radioactive materials may result in a loss of control of the materials, improper disposal, spread of contamination, or personnel exposures. (ORPS Reports OH-WV-WVNS-AEL-1997-0001)

At the West Valley Demonstration Project, a warehouse employee noticed a radioactivity warning (trefoil) on the gas chromatograph casing he was storing in a non-radioactive storage facility. He notified laboratory personnel and radiation protection management. A radiation protection worker found a sticker on the instrument casing that stated that the chromatograph contained a 15 mCi, Ni-63 source. Investigators determined that the source was not included in the site source inventory. They also found that the chromatograph was shipped off-site over public roads and the packaging lacked the required wording. A facility manager directed a review of the site inventory program and personnel identified five additional on-site instrument components containing radioactive sources. These sources have been added to the radioactive source inventory.

At the Sandia National Laboratory, receiving personnel received and staged a package for regular distribution. They shipped the package, containing radioactive materials, to the on-site end-user without first performing the proper radiological surveys. They also used an on-site distribution driver who was not authorized to transport radioactive material. Investigators determined that this violation occurred because the receiving personnel did not recognize that the box contained radioactive sources and processed the box according to procedures for non-radioactive materials. The box contained Americium-241 sources similar to those used for smoke detectors and was in compliance with DOT regulations for inbound shipments. The box did not present a hazard to any personnel or facilities.

NFS has reported on numerous occurrences about inventory and control of radioactive materials in the Weekly Summary. Following are some examples.

- Weekly Summary 97-34 reported that a facility manager at the Sandia National Laboratory reported loss of accountability of a sealed, 150 mCi tritium source contained in an electron-capture detector and installed in a gas chromatograph. A source custodian did not take responsibility for the source when it was received from the manufacturer, so it was not registered with Sandia's source registrar. (ORPS Report ALO-KO-SNL-6000-1997-0007)

- Weekly Summary 96-16 reported that radiological control technicians at Rocky Flats discovered a radioactive source that appeared to be a contaminated bolt. A technician was performing a routine radiological survey when he found the source on top of a storage drum. Radiological engineers examined the bolt and determined that it was a radiological source holder containing cesium-137. (ORPS Report RFO--KHLL-771OPS-1996-0052)

- Weekly Summary 94-24 reported that personnel at the Hanford Site discovered a cesium-137 source that was not on their sealed radioactive source accountability list. The source was part of a nuclear liquid-level measuring instrument that contained 10 µCi of cesium-137. Health physics technicians established proper control of the source. (ORPS Report RL--WHC-GENERAL-1994-0008)

- Weekly Summary 94-22 reported that radiation control personnel at the Sandia National Laboratory found four radioactive sources that were not entered into the radioactivity source accountability system. A promethium source, measuring 460 mrem/hr beta on contact, was inside a measurement device without a shield in place to prevent exposure. The other three sources were sealed and measured 86 mrem/hr beta on contact. Investigators determined that Sandia personnel lost track of the four sources because they were not entered into the radioactive source accountability system. (ORPS Report ALO-KO-SNL-1000MDL-1994-0002)

These occurrences underscore the need for receiving organizations to have the necessary programs, procedures, and training in place to correctly handle incoming shipments of materials and equipment that could contain radioactive sources. Failure to follow proper handling procedures can result in lost sources, improperly discarded sources, and failed source integrity and can lead to the spread of contamination and personnel exposure. The DOE facility representative reported that Sandia personnel are implementing program changes and corrective actions on similar occurrences at Sandia. The recent event occurred while these changes were being implemented.

DOE/EH-256T, *Radiological Control Manual,* requires control and accountability of radioactive materials. The majority of pertinent radiological protection requirements have become codified through promulgation of 10 CFR 835, *Occupational Radiation Protection*. However, 10 CFR 835 currently does not address sealed radioactive source accountability; source accountability will be addressed in a pending revision. Facility managers should refer to DOE N 441.1, *Radiological Protection for DOE Activities*, for information on the control and accountability of sealed radioactive sources. The administrative lifespan of DOE N 441.1 was from September 30, 1995, to September 30, 1996, but this was extended by DOE N 441.2 until 10 CFR 835 is revised.

**KEYWORDS:** source, inventory, accountability, radiation protection

**FUNCTIONAL AREAS:** Procurement, Radiation Protection

## 6. WORKERS SPREAD DEBRIS CONTAINING ASBESTOS

On December 3, 1997, at the Fernald Environmental Management Project, craft personnel removing a heating, ventilating, and air conditioning unit spread asbestos-containing material through part of an office building as they carried pieces of the unit from the building. The craft personnel were supposed to call an industrial hygienist when the back of the unit could be accessed and verified to be free of asbestos-containing materials. However, a miscommunication occurred, and they did not notify the industrial hygienist until after the unit was removed from the building. A facility manager ordered evacuation of the area, shut-down of area ventilation, and performance of a safe clean up. The miscommunication resulted in the spread of asbestos-containing materials and the exposure of building occupants to a known carcinogen. (ORPS Report OH-FN-FDF-FEMP-1997-0054)

The craft personnel did not recognize that the debris included asbestos-containing material and asked a porter to vacuum the area. The porter began cleaning the work area on December 4. Because she had recently attended an asbestos awareness training class, she suspected that there was asbestos-containing material in the debris. She reported her suspicion to her supervisor who notified an industrial hygienist. The industrial hygienist collected air samples and samples of the debris. He confirmed that the debris contained asbestos and approved the building for occupancy based on satisfactory air sampling results.

Investigators determined that an industrial hygienist had inspected the area in the vicinity of the air conditioning unit. He also approved the work order with the condition that he would be notified by the craft personnel when work progressed to the point where he could gain access to materials behind the unit. Investigators also determined that the industrial hygienist discussed this conditional approval with the maintenance planner during job planning. However, the maintenance supervisor thought that the instructions meant that the industrial hygienist should be contacted after the workers removed the unit from the building. Investigators also determined that, although the craft workers had received asbestos awareness training, they did not recognize that they were spreading suspect asbestos-containing material. Based on the results of air sample analysis, the industrial hygienist determined that maximally exposed workers received a fraction of the OSHA permissible exposure limit. The cleanup effort included high-efficiency particulate vacuuming of carpets and wet-wiping of smooth surfaces.

NFS reported a similar event in Weekly Summary 96-43, about nine maintenance workers at the Los Alamos National Laboratory who were exposed to asbestos fibers while removing filter media from a cooling tower. They were working directly with asbestos-containing materials without wearing appropriate protective equipment. The pre-job review team conducted a preliminary hazard analysis and failed to identify asbestos within the filter media.

OEAF engineers found an article in the November 1990, *Industrial Hygiene News* on building maintenance workers and their exposure to asbestos hazards. This article stated that as many as 158 out of 303 building heating, ventilating, and air conditioning workers studied had asbestos-related damage on the inner surface of their lungs.

OEAF engineers searched the ORPS database for events at Fernald and DOE-wide with either a direct, contributing, or root cause attributed to "communication problem." Figure 6-1 shows the data from 1992 to the present at Fernald and DOE-wide. The data was normalized by showing occurrences with a cause of communication problem as a fraction of all occurrences per year. OEAF engineers performed a statistical test to determine the significance of the increase in the fraction of occurrences attributed to communications problems in 1996 and 1997 compared to 1992 to 1995. They found there was a 95 percent probability that the fraction had increased by at least 75 percent.

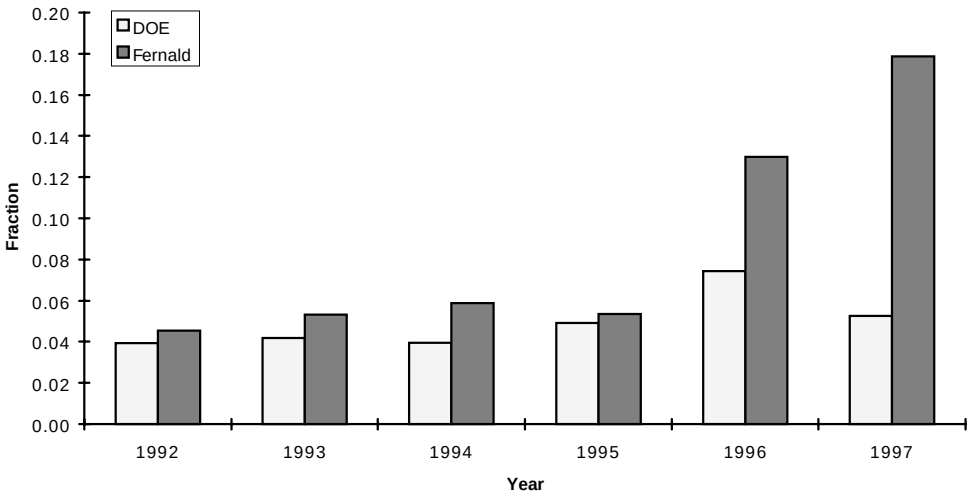



**Figure 6-1. Fraction of Occurrences Attributed to "Communication Problem" at Fernald and DOE-Wide[1]**

[1] OEAF engineers searched the ORPS graphical user interface database using a direct cause, contributing cause, or direct cause of "3C, Communication Problem," and compared it to the results for the entire database. They also performed the same searches for the Fernald Plant, only.

These events underscore the importance of adequate communication in general and asbestos awareness training in particular. Facility managers responsible for establishing and administering asbestos training programs and asbestos operations and maintenance plans should refer to publications available from OSHA. OSHA booklet 3095, *Asbestos Standard for General Industry*, provides general guidance for monitoring exposures, regulating areas, and controlling asbestos. The booklet states that employers must establish regulated areas wherever airborne concentrations of asbestos or suspect asbestos-containing material are likely to exceed the permissible exposure limit of 0.1 fiber per cubic centimeter over an 8-hour, time-weighted average. Where engineering and work practice controls are insufficient to reduce exposure to the required level, the employer must supplement them with respiratory protection. Copies of the OSHA booklet and other asbestos documents can be obtained at URL http://www.osha.gov/oshpubs/. The Asbestos Advisor, an interactive compliance assistance tool is available for downloading from OSHA at URL http://spider.osha.gov/oshasoft/.

DOE 421.3, *Nuclear Safety Analysis Reports*, and DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, provide guidance for protecting personnel from hazardous materials. Hazardous materials are those that can adversely impact the health and safety of the public or pose a reasonable risk to workers.

**KEYWORDS:** asbestos, communication, hazard analysis, work planning

**FUNCTIONAL AREAS:** Industrial Safety, Mechanical Maintenance, Work Planning

# *PRICE-ANDERSON AMENDMENTS ACT (PAAA) INFORMATION*

## 1. DEPARTMENT OF LABOR CONFIRMS RETALIATORY ACTIONS TAKEN AGAINST WORKER FOR RAISING SAFETY CONCERNS

On November 10, 1997, the U. S. Department of Labor (DOL) rendered a decision finding that Westinghouse Hanford Company (WHC) took retaliatory action against a former employee for raising safety concerns. Several of the safety concerns raised by the employee involved nuclear safety-related matters. The former employee and a co-worker had testified before a U. S. House of Representatives subcommittee at the request of the subcommittee. The subcommittee was holding hearings concerning inadequacies in environmental, public health, safety, and quality assurance programs at DOE nuclear weapons facilities, including the Hanford site. One of the concerns raised by the former employee involved the alleged deliberate removal of radiation warning signs by contractor personnel along the route taken by the governor of Washington State during a tour. This action allegedly was taken so the governor would not learn that a major contamination accident had occurred at the Hanford site.

According to DOL, WHC retaliated against the employee for assisting the congressional subcommittee. DOL found that a WHC manager did, in fact, retaliate against the employee. The manager assigned the employee to provide extensive information within a short time and addressed him “sarcastically.” Furthermore, DOL found that WHC retaliated by rejecting the employee for a position for which he was well qualified.

This case demonstrates the types of issues for which DOE can now undertake enforcement action (Notices of Violation and civil penalties) against its indemnified contractors, subcontractors, and their suppliers under the enforcement provisions of the Price-Anderson Amendments Act of 1988. Specifically, 10 CFR 708 (*DOE Contractor Employee Protection Rule*) provides protection from retaliation and discrimination to employees who raise concerns, including nuclear safety-related concerns. This rule has been designated as a nuclear safety rule subject to DOE enforcement actions under the *Procedural Rules for DOE Nuclear Activities* (10 CFR 820).

When it is determined that a contractor employee has been retaliated against by his management for raising nuclear safety-related concerns, that contractor is subject to enforcement action in accordance with DOE's enforcement policy. It is not a defense if the underlying alleged nuclear-safety concern is ultimately determined to lack merit. The decision to pursue an enforcement action is premised on whether employees feel free to raise such concerns without the fear of retaliation by their management.

The Office of Enforcement and Investigation is providing this information to alert contractors to their responsibilities and liabilities in this area.

**KEYWORDS:** Price-Anderson Act, safety

**FUNCTIONAL AREAS:** Lessons learned, Licensing/Compliance